

Application No.: 10/726900

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17. (Original) The membrane module of claim 6, wherein said module further comprises a secondary manifold in fluid connection with said fluid flow channel of said primary manifold.
18. (Original) The membrane module of claim 1, wherein tension is applied to said membrane elements to aid in maintaining the spacing of said membrane elements.
19. (Original) A membrane cassette comprising at least two of the membrane modules of claim 1.
20. (Original) The membrane cassette of claim 19 further comprising a frame surrounding or supporting said membrane modules.

REMARKS

Claims 1 to 20 are pending in this application. Claims 1-8, 11, 12, and 15-20 stand rejected under § 102 and/or § 103. Claims 9, 10, 13, and 14 have been objected to by the Examiner as depending on a rejected base claim, but would otherwise be allowable if rewritten in independent form. By this amendment, claims 2, 6, 7 and 8 have been canceled, and claims 1, 3, 9 and 11 have been amended.

Amendment

Claim 1 has been amended to recite that the primary manifold comprises two flow channels, the first flow channel delivering a first fluid to the interior portion of the membrane elements, and the second flow channel delivering a second fluid, such as a gas, to the space between the membrane elements. Support for this amendment is found, for example, in original claims 2, 3, 6 and 7. Claim 9 has been amended to put it into independent form. No new matter is added by these amendments.

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Double Patenting

Claims 1-8, 11, 12 and 15-20 are provisionally rejected for obviousness-type double patenting as being unpatentable over claims 1 and 11 of copending Application No. 10/438090. Since this is a provisional rejection, applicants will consider filing a terminal disclaimer, if appropriate, when the conflicting claims are otherwise in condition for allowance.

§ 102 Rejections

Claims 1-8, 15 and 18 stand rejected under 35 USC § 102(b) as being anticipated by Wataya et al. (U.S. Patent No. 5,651,889). Claims 1-8, 11, 12, and 15-20 stand rejected under 35 USC § 102(b) as being anticipated by Kopf. (U.S. Patent No. 5,868,930). Claims 1-6, 15, 19, and 20 stand rejected under 35 USC § 102(b) as being anticipated by Japanese Patent No. 07016591 or Japanese Patent No. 11-244672. Applicants respectfully traverse these rejections as applied to the amended version of the claims.

Wataya et al.

Wattaya describes a membrane apparatus that includes a bubble supplying portion (col. 3, lines 21-29, and abstract). The apparatus as shown in FIG. 1 comprises a circulating tank 3 with a sludge inlet 301 and sludge outlet 302 (col. 6, lines 15-20). The Examiner considers the circulating tank 3 to be a manifold (office action, p. 3). In addition, the apparatus further comprises an aeration pipe 4 that delivers micro bubbles to the inter-membrane passages 108 (FIG. 1 and col. 6, lines 44-48).

Although the apparatus depicted in Wataya et al. has both a manifold and a means for delivering gas bubbles to the space between the membrane elements, the manifold itself does not comprise a means for delivering the gas bubbles to the space between the membrane elements. Instead, the Wattaya apparatus uses a separate aeration pipe to deliver the gas bubbles. Furthermore, Wattaya lacks a manifold comprising two flow channels – one for delivering a first fluid to the interior portion of the membrane elements and the second for delivering a second fluid, e.g. gas bubbles, to the space between the membrane elements, as recited in claim 1. Since this reference fails to teach all the elements of amended claim 1, it does not anticipate amended claim 1 or any of its dependent claims.

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Kopf

Kopf describes an assembly of filtration cassettes that are made up of filter sheets bonded to either side of a permeate sheet, as shown in FIG. 2. Compressible retentate sheets create space between adjacent filtration cassettes, as shown in FIG. 1. Kopf discloses manifolds MP_1 and MP_2 in FIG. 18. MP_2 has an inlet I through which the material to be filtered is introduced into the assembly (col. 23, lines 46-49). MP_1 has an outlet O from which retentate (material that did not pass through the filter sheets) is discharged from the filter assembly and permeate port PT from which the collected permeate (material that has passed through a filter sheet) is discharged from the filter assembly (col. 23, lines 34-39).

The fluid from inlet I flows to feed distributions basins located between adjacent filter sheets (col. 18, lines 10-16). Kopf does not specifically state that inlet I is used to deliver gas bubbles or another second fluid to the spaces between the filter sheets; however, the Examiner asserts that the flow arrows shown in FIG. 18 depict a means for gas bubbles to be delivered to cassette.

Although it might be possible, as the Examiner suggests, that a mixture of two fluids (e.g. (1) a liquid to be filtered and (2) a gas) could be introduced into a inlet I to feed distribution basins between neighboring filtration elements, FIG. 18 and the associated description in column 13 of Kopf do not depict a primary manifold that is in fluid connection with the flow channels of the interior portion of the membrane elements and can perform the dual functionality of (1) delivering a first fluid to the interior portion the membrane elements and (2) delivering a second fluid, e.g. gas bubbles, to the space between the membrane elements. Thus, Kopf fails to disclose all of elements of amended claim 1 and its dependent claims.

JP 07016591

JP 07016591 discloses a manifold 53 in fluid connection with a liquid permeate exit pipe 51, as described in paragraph 14 and shown in FIG 4. JP 07016591 discloses a filtration assembly disposed in a concrete aeration tank. Gas bubbles are delivered by means of separate air pipes arranged under the filtration assembly. JP 07016591 does not disclose a primary manifold that is in fluid connection with the flow channels of the membrane elements and provides both a means for

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delivering a first fluid to the interior portion of the membrane elements (i.e. through a first flow channel) and a means for delivering second fluid, e.g. gas bubbles, to the space between the membrane elements (i.e. through the second flow channel), as is recited in amended claim 1. Thus, JP 070165921 fails to anticipate amended claim 1 or any of the claims dependent on amended claim 1.

JP 11-244672

JP 11-244672 discloses a filtration assembly. Gas delivery is performed by an air supply pipe 62 that is attached to unfiltered liquid supply pipe 56. JP 11-244672 discloses a permeate flow route through mesh 11, film support 15, nozzle 19, liquid collecting pipe 59, and filtered fluid exit 58, as shown in paragraphs 31 and 35. The Examiner has identified the mesh 11 as creating flow channels. JP 11-244672 does not disclose a manifold that is both in fluid connection with the flow channels of the membrane elements and provides a means for delivering second fluid, e.g. gas bubbles, to the space between the membrane elements (i.e. through the second flow channel). Thus, JP 11-244672 fails to anticipate amended claim 1 or any of the claims dependent on amended claim 1.

§ 103 Rejections

Claims 11, 12, 16, 17, 19 and 20 stand rejected under 35 USC § 103(a) as being unpatentable over Thompson et al or Wataya et al in view of Sirkar (4789468). Applicants respectively traverse this rejection.

Claims 11, 12, 16, 17, 19 and 20 all depend directly or indirectly from amended claim 1, which is patentable for the reasons given above. Thus, claims 11, 12, 16, 17, 19 and 20 are likewise patentable.

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Conclusion

In view of the above, it is submitted that the application is in condition for allowance.
Reconsideration of the application is requested.

Respectfully submitted,

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Date

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